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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

NGUYEN, TU MINH

ART UNIT

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/591,046	Applicant(s) MATSUOKA ET AL.	
	Examiner TU M. NGUYEN	Art Unit 3748	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 December 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 and 7-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5 and 7-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 August 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. An Applicant's Amendment filed on December 17, 2007 has been entered. Claim 6 has been canceled; and claims 1 and 16 have been amended. Overall, claims 1-5 and 7-17 are pending in this application.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-5 and 10-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schaller et al. (U.S. Patent 6,948,311) in view of Tashiro et al. (U.S. Patent 6,622,480).

Re claims 1 and 16, as shown in Figure 1-3, Schaller et al. disclose an exhaust purifying apparatus and a method for purifying exhaust gas for an internal combustion engine (100), the apparatus comprising:

- an exhaust purifying mechanism (115b) that is located in an exhaust passage (110) of the internal combustion engine, wherein the exhaust purifying mechanism traps particulate matter in exhaust gas;

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- a fuel adding device (182) for adding fuel to exhaust gas that passes through the exhaust purifying mechanism;

- a detecting section (192) that detects a pressure difference between a section upstream and a section downstream of the exhaust purifying mechanism (see lines 4-7 of column 7);

- a comparing section (step 270), wherein, while the fuel adding device is adding fuel to exhaust gas, the comparing section monitors the pressure difference that is detected by the detecting section at a predetermined point in time (see line 38 of column 6 to line 7 of column 7); and

- a setting section, wherein, when the comparing section determines that the pressure difference has satisfies a specific requirement, the setting section sets the manner of adding fuel of the fuel adding device to intermittent fuel addition (in the embodiment of Figure 3, even when a retention time has expired (step 270 with a positive answer), the fuel adding device (182) intermittently adds fuel into the exhaust during a third phase to prevent a decrease in temperature during a regeneration of the exhaust gas purifying mechanism (see Figure 3, lines 22-25 of column 7, lines 1-3 of column 8, claim 4)).

Schaller et al., however, fail to specifically disclose that in the setting section, the “specific requirement” means that the pressure difference exceeds a pressure difference reference value; and that the predetermined point in time is a point in time at which an estimated accumulation amount of particulate matter in the exhaust purifying mechanism becomes equal to or less than a threshold value.

As shown in Figure 1, Tashiro et al. disclose a diesel particulate filter unit (4) and a regeneration control method for said unit. As illustrated in Figure 8, Tashiro et al. teach that

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during a regeneration of the filter unit, it is conventional in the art to monitor a pressure difference between an upstream and a downstream location of the filter unit by using sensors (51, 52) and adjust (in step S33) an injection of fuel into the exhaust gas when the pressure difference is less than or equal to a second pressure difference reference value ($\Delta Pe2$) and is greater than a third pressure difference reference value ($\Delta Pe3$), wherein the pressure difference less than or equal to $\Delta Pe2$ is equivalent to an estimated accumulation amount of particulate matter in the filter unit becoming equal to or less than a threshold value. It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the teaching by Tashiro et al. in the apparatus and method of Schaller et al., since the use thereof would have been routinely practiced by those with ordinary skill in the art to save fuel and to protect a filter from thermal damage during its regeneration.

Re claims 2-3, as taught by Tashiro et al., in the modified apparatus of Schaller et al., the predetermined point in time is a first point in time, and the pressure difference reference value ($\Delta Pe3$) is a first pressure difference reference value, and wherein, after the setting section sets the manner of adding fuel to the intermittent fuel addition (as in Schaller et al.), the comparing section compares (step S35 in Tashiro et al.) the pressure difference that is detected by the detecting section at a second point in time that is different from the first point in time with a second pressure difference reference value ($\Delta Pe4$) that has been set in correspondence with the second point in time, wherein when the pressure difference detected at the second point in time becomes equal to or less than the second pressure difference reference value, the setting section ends the intermittent fuel addition (step S35 has positive answer and step S36).

Re claim 4, in the modified apparatus of Schaller et al., when an estimated accumulation amount of particulate matter in the exhaust purifying mechanism becomes zero after setting the manner of adding fuel to the intermittent fuel addition, the setting section ends the intermittent fuel addition.

Re claim 5, in the modified apparatus of Schaller et al., after setting the manner of adding fuel to the intermittent fuel addition, the setting section sets the fuel addition of the intermittent fuel addition to be performed a predetermined number of times (see lines 43-49 of column 6).

Re claims 10-11, in the modified apparatus of Schaller et al., it is obvious that when an intake air amount of the internal combustion engine is equal to or more than a predetermined amount (i.e., when the engine is in operation with an intake air amount is greater than zero), the detecting section detects the pressure difference between a section upstream and a section downstream of the exhaust purifying mechanism.

Re claim 12, as taught in Figure 6 of Tashiro et al., in the modified apparatus of Schaller et al., the pressure difference reference value is increased as the intake air amount of the internal combustion engine is decreased.

Re claims 13-14, the modified apparatus of Schaller et al. discloses the invention as cited above, however, fails to disclose that the pressure difference includes an average value of pressure differences detected or a value obtained by smoothing pressure differences detected during a period from the point in time until a predetermined time elapses.

Since applicant fails to challenge the examiner's official notice that it is well known to those with ordinary skill in the art that in Schaller et al., the pressure difference includes an average value of pressure differences detected or a value obtained by smoothing pressure

differences detected during a period from the point in time until a predetermined time elapses, it is therefore assumed that applicant has acquiesced with the examiner on such feature or limitation.

Re claim 15, in the modified apparatus of Schaller et al., the exhaust purifying mechanism includes an exhaust purification catalyst (115a) through which particulate matter in exhaust gas passes and an exhaust purifying member (115b) that is located downstream of the exhaust purification catalyst and traps the particulate matter, and wherein the detecting section detects a pressure difference between a section upstream and a section downstream of the exhaust purifying member (115b).

4. Claims 7-9 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schaller et al. in view of Tashiro et al. as applied to claim 1 above, and further in view of Christen et al. (U.S. Patent 6,405,528).

Re claims 7-8, the modified apparatus of Schaller et al. discloses the invention as cited above, however, fails to disclose that the apparatus further comprises an estimating section and a correction section, wherein the estimating section estimates the amount of noncombustible matter in the exhaust purifying mechanism based on the pressure difference detected when the intermittent fuel addition is ended, and wherein the correction section corrects the pressure difference detected by the detecting section or the pressure difference reference value based on the amount of noncombustible matter estimated by the estimating section.

As shown in Figures 1 and 3, Christen et al. disclose a method for determining load on a particulate filter unit (16b) for engine exhaust, including estimation of ash content. As indicated on line 15 of column 6 to line 45 of column 7, Christen et al. teach that it is conventional in the

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art to estimate an amount of noncombustible matter (ash) in the filter unit based on a pressure difference detected when a regeneration of the filter unit is ended; and corrects at least one of a pressure difference detected by the detecting section and the pressure difference reference value based on the amount of noncombustible matter. It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the teaching by Christen et al. in the modified apparatus of Schaller et al., since the use thereof would have been routinely practiced by those with ordinary skill in the art to accurately determine a regeneration timing for the filter unit.

Re claims 9 and 17, in the modified apparatus of Schaller et al., the estimating section estimates the amount of noncombustible matter based on the pressure difference detected when the preceding intermittent fuel addition was ended and the pressure difference when the current intermittent fuel addition is ended (see lines 55-60 of column 6 in Christen et al.).

Response to Arguments

5. Applicant's arguments with respect to the references applied in the previous Office Action have been fully considered but they are not persuasive.

In response to applicant's argument that Schaller et al. and Tashiro et al. fail to disclose or teach that the predetermined point in time is a point in time at which an estimated accumulation amount of particulate matter in the exhaust purifying mechanism becomes equal to or less than a threshold value (page 7 of the Applicant's Amendment), the examiner respectfully disagrees.

Schaller et al. carefully monitor a filter during a regeneration step of the filter to prevent its temperature from exceeding a critical value that may damage the filter or from dropping below a lower limit that adversely affects a burning of the trapped soot. In Schaller et al., a step 270 in Figure 2 is performed to determine if a “retention time” has expired. This “retention time” is defined as a period of time after which, a soot burning in the filter has set in or a regeneration of the filter has begun. Schaller et al. determine the “retention time” by monitoring a pressure difference across the filter (lines 4-7 of column 7). When a “retention time” in Schaller et al. has expired, a fuel is intermittently injected into an exhaust stream to maintain the filter at a desired regeneration temperature range.

Similar to Schaller et al., Tashiro et al. also monitor a filter during its regeneration. As depicted in Figure 1, Tashiro et al. also utilize a set of pressure sensors (51, 52) to detect a pressure difference across the filter. As illustrated in Figure 8, Tashiro et al. adjust in step S33 an injection of fuel into an exhaust gas stream when the pressure difference is less than or equal to a second pressure difference reference value ($\Delta Pe2$), wherein the pressure difference less than or equal to $\Delta Pe2$ is equivalent to an estimated accumulated amount of soot in the filter becoming equal to or less than a threshold value.

Based on the above teaching by Tashiro et al., it is obvious to one with ordinary skill in the art that Schaller et al. detect a decrease in accumulated soot amount in their filter during a regeneration step before intermittently injecting a fuel into the exhaust gas stream to keep the filter within a desired regeneration temperature range.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Communication

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Tu Nguyen whose telephone number is (571) 272-4862.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Thomas E. Denion, can be reached on (571) 272-4859. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TMN

March 15, 2008

/Tu M. Nguyen/

Tu M. Nguyen

Primary Examiner

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